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ABSTRACT

This booklet on technology is one of a series in environmental education for grades K-12. It is concerned with the relationship of technology to the use of resources and the effect of technology on the environment. Four basic concepts are listed, along with behavioral objectives, subject areas, key words, and definitions for each. The three activity options developing each concept include the following information: materials and resources, procedures, discussion questions, further activities, and sample worksheets. These activities include surveys, filmstrips, role play, and collages for students in grades 6-8. (MA)

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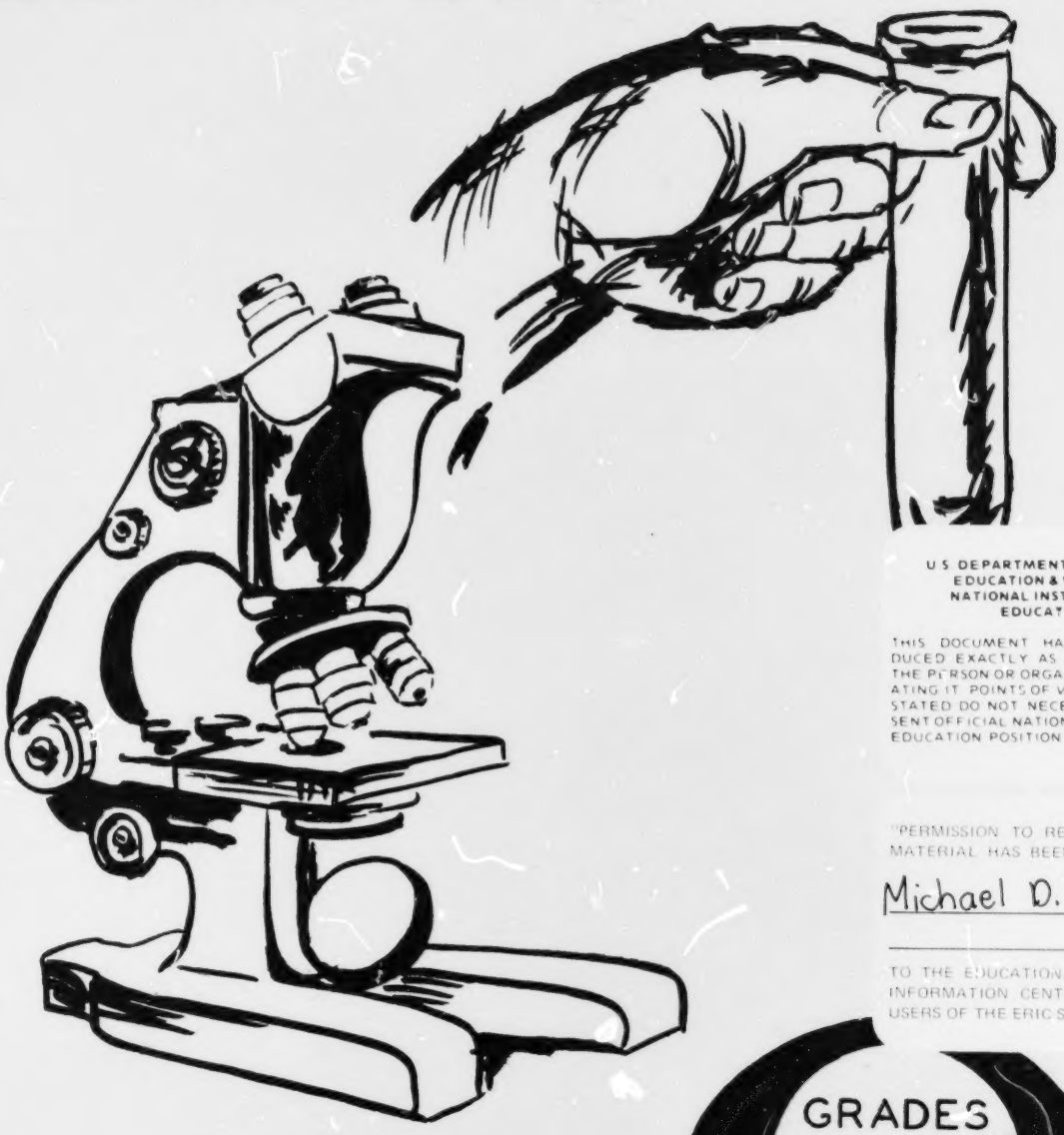
TECHNOLOGY



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GRADES 6

ENVIRONMENTAL EDUCATION

VALUES FOR THE FUTURE

ANTIOCH COMMUNITY SCHOOL DISTRICT 34

TITLE IV C ESEA

SE 023 457

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EXPLANATION OF CONCEPT AREA

TECHNOLOGY - Our vision of technology as a pure good that has brought man from primitive times to our modern lifestyle without major difficulties must be expanded to include the negative aspects so that we can understand the danger of taking technology for granted.

In the beginning we deal with the idea of work and our personal needs as supplied by technology.

We then progress to the rate of change of technology and its influence upon our lifestyle and environment.

The students then explore the timeline of technology and how technology is related to the use of resources. Technology is also examined for its effects on the environment.

In high school students examine the role of technology in the development of demand and its relationship to social costs and trade-offs.

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to give an example of how an application of technology has economic, social, and/or ecological impact.

SUBJECT AREAS:

Science, Social Studies, Language Arts, Art, Mathematics

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OPTION #1

MATERIALS AND RESOURCES

30 sheets of large paper
Pencils
Stopwatch or a watch with a second hand

PROCEDURE:

1. The class will attempt to simulate an assembly line. Have the students line up the desks in a circle. A continuous line is an important feature of this option.

2. Have the students line up behind their desks. Their job will be to make a product out of a piece of paper.

3. The product can be many things.

   a. Have each student plug in a letter or two on the following title, "Industrial Revolution and Scientific Knowledge Equals Technology".

   b. A collage

   c. An art project such as the drawing of a face. Each student is assigned a particular part of the picture, organism, mosaic, etc.

4. The teacher might assign some students to different roles such as carriers or time counters.

5. Have the students produce the product slowly. Then explain you are the foreman in the factory and time is money. Product must be more rapid. Time them.

6. Each time demand they do it faster. Single out certain students and raise your voice. Berate them!

7. Have each student do the lettering individually.

8. Now display both individual and production line products.

DISCUSSION QUESTIONS

1. Did the product change from the first to the last? How? Which was neater?

2. How does the speed of making the product affect the finished product?

3. How do the individual products compare to the assembly line products?

4. How would you like to work on an assembly line for the rest of your life? (You might schedule this activity for an all-day project.)

5. How does the speed of the assembly line affect people's attitudes?

6. Do you think the assembly line has made people's lives better or worse? Why?

7. Why did the assembly line replace the individual or home factories?

8. What is more important about the product - that it is cheaper or that it works?

OPTION #1 cont.

9. How has the assembly line affected the American economy?

10. Is there room for individual pride in one's work?

OPTION #2

MATERIALS

Magazines
Scissors
Glue or paste
Posterboard

PROCEDURE:

1. Discuss and decide upon the meaning of the understanding.

2. Divide the class into groups of three or four.

3. Half of the groups should be instructed to make a collage that would illustrate the forms of technology that represent American society, i.e. transportations, homes, appliances, medicines, architectures, etc. Each group should take a separate category.

4. The other groups should be instructed to make their collage to illustrate the impact of these forms of technology - social, economic, and ecological.

5. When complete display the collages on separate walls or side by side.

DISCUSSION QUESTIONS

1. What are some forms of technology that our society cannot do without?

2. Of these we cannot do without, is there any way we might lessen their impact on the environment?

3. The assembly line process is a larger factor in our country's ability to produce great numbers of consumer goods. What impact does the assembly line have on the consumer? What impact does it have on the worker? Are there ways to increase the positive but decrease the negative aspects?

4. Can individual people help lessen the negative impact on the environment and still have those things we need?

5. If you had a choice between a large luxury automobile or a small economy car, which would you take?

6. Do our individual choices influence what is produced?

7. Can technology help solve some of the problems we have discussed?

OPTION #3

MATERIALS

Matches
Metal container (coffee can works well)
Paper

PROCEDURE: ROOM MUST HAVE A FIRE EXTINGUISHER ON HAND. ADVISE PRINCIPAL OF THE NATURE OF THIS OPTION.

1. Close all the curtains, doors, and windows of the classroom. Turn off all the lights. The room should be dark but not pitch black.

2. Explain to the class that the classroom has become a closed area in which everyone is freezing. Technology has discovered that burning scrap paper could keep us warm.

3. Divide the class into groups of three and give each group a book of matches. It is their job to survive .

4. After ten or fifteen minutes ask the students to put out the fires and leave the room. Turn on all the lights and open the shades. Ask the students to re-enter. At this point discuss the impact of the students' need to survive versus the damage to the environment. Discuss in particular the rights of the individual and of a group as opposed to needs.

DISCUSSION QUESTIONS

1. How did we solve our problem?

2. How did we create a problem while trying to solve another?

3. What are the problems?

4. What damage has our solutions done?

5. What were our individual needs?

6. What are the needs of society?

7. What are the needs of the environment?

8. How will the need to survive affect the society eventually?

9. How have we done this in our own society?

TECHNOLOGY 10

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student should be able to give examples of the effects of technology that are either immediate or delayed and either detrimental or beneficial.

SUBJECT AREAS:

Social Studies, Language Arts

OPTION #1 - one or two days

MATERIALS AND RESOURCES

The Big Pull Zipper Company article, included

PROCEDURE:

1. The instructor should begin by reading the article to the class. No further information should be given.

2. The instructor should ask the students to decide whether they are 1) strongly in favor of closing the company (these persons should sit on one side of the room 2) strongly opposed to closing the company (these persons should sit on the other side of the room and 3) neutral (they should stay in the middle of the room).

3. Now the instructor should lead a discussion and debate among the groups to see who can be swayed to move from one side of the room to the other, or from the middle, etc.

4. Instructor must be careful to see that as many students as possible are participating in the debate. This project requires that the instructor ask some good leading questions to keep the debate at a good pitch. Let the students think of alternatives, etc.

5. If the debate is carried on for more than one day, have the students do some research to back their personal point of view. Use of newspaper articles, magazines, etc. might prove invaluable in debating their view point.

6. See how many students are swayed from one point of view to another or else set up a courtroom situation with a panel of judges to determine whether BIG PULL should remain open and clean up five years from now or if it should be closed immediately.

DISCUSSION QUESTIONS

1. What are the immediate effects of the BIG PULL ZIPPER COMPANY - both good and bad?

2. What are some things which might be done to keep the company operating, yet, at the same time reduce its damaging effects?

3. If no precautionary measures are taken, what might result?

FURTHER ACTIVITIES

Have the students research individual problems of this sort which are taking place at the present time and prepare reports for the class. Have them decide what might be done to prevent such abuses in the future.

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THE BIG PULL ZIPPER

THE BIG PULL ZIPPER COMPANY IS THE CENTRAL LANDMARK IN THE TOWN OF NAVAL, ILLINOIS. THE COMPANY HAS BEEN IN EXISTENCE FOR AS LONG AS ANYONE CAN REMEMBER. THE EXISTENCE OF NAVAL DEPENDS SOLELY UPON BIG PULL. OF THE 400 ADULT RESIDENTS OF THE TOWN, 320 ARE EMPLOYED BY BIG PULL. THE REMAINDER OWN SMALL SHOPS AND STORES PROVIDING SERVICES FOR THE LOCAL PEOPLE.

NAVAL IS LOCATED IN A RURAL LOCALE, SURROUNDED BY FARMLAND. THE NEAREST BIG TOWN (OVER 1500) IS LOCATED FIFTY MILES AWAY. THUS NAVAL IS VERY DEPENDENT ON BIG PULL CO. FOR SURVIVAL.

LATELY, HOWEVER, BIG PULL AND THE TOWN OF NAVAL HAVE BEEN MAKING HEADLINES. FOR YEARS THE COMPANY HAS DUMPED ITS HOT METALLIC WASTES INTO LAKE INFERIOR AND NO ONE SEEMED TO CARE. AFTER ALL, THE LAKE IS LARGE ENOUGH TO TAKE THESE WASTE PRODUCTS. HOWEVER, SOME ECOLOGISTS VISITED NAVAL RECENTLY AND NOTED THE DAMAGE THAT BIG PULL WAS DOING TO THE LAKE. WILDLIFE WAS BEING KILLED AND THE LAKE WAS BEING POLLUTED.

NOW BIG PULL WAS BEING TAKEN TO COURT AND MAY HAVE TO CLOSE, CAUSING DISASTEROUS ECONOMIC EFFECTS IN NAVAL. IT WOULD TAKE THE COMPANY AT LEAST FIVE YEARS TO MEET THE FEDERAL STANDARDS FOR DUMPING THEIR WASTE MATERIALS, YET IF THE COMPANY IS CLOSED, THE PEOPLE OF NAVAL WILL HAVE NO MEANS OF INCOME.

OPTION #2

MATERIALS AND RESOURCES

Two or three sheets of larger than standard size paper
Pencils
Stopwatch or watch with second hand

PROCEDURE:

1. The class will attempt to simulate an assembly line. Have the students line up the desks, possibly in a continuous circle. A continuous line is the important thing.

2. Have the students stand behind their desks. Tell them they are going to make a product out of the sheet of paper.

3. The product can be many things. However, a simple statement written on the paper such as "Industrial Revolution and Scientific Knowledge Equals Technology" will suffice. Each student plugs in a letter or two as the paper is passed along the assembly line.

4. The teacher might assign some students to different roles such as carriers or time counters, etc.

5. Have the students produce the product slowly. Then explain to them you are the foreman in the factory and they must produce the product quickly. Time them.

6. Each time, repeat. Demand they do it faster. Single out certain students and raise your voice.

7. After at least ten times, stop the line and look at the product. Show the class the first through the last.

8. Using a rubber stamp kit, form a stamp which would take the jobs of five or six of the students, i.e. it would do the writing of this group of students.

DISCUSSION QUESTIONS

1. We applied technology - the rubber stamp - what are some of the advantages? (speed, neatness, etc.)

2. What are some of the disadvantages of this application of technology? (unemployment, etc.)

3. What might be some future advantages and disadvantages if technology continues at this pace?

4. Advancements in technology usually produce better products. Is there a time when these advances should be discarded due to the number of disadvantages they produce? Explain your answer.

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OPTION #3

MATERIALS AND RESOURCES

Filmstrip, The TVA: Conservation in the Tennessee Valley, available E^2 Office
Article on dams, Reader's Digest, June '77

PROCEDURE:

1. The filmstrip does a fine job of establishing the positive and negative effects of the technology of TVA. The teacher should take note the following aspects of the filmstrip:

   a. The history and conditions of the area before TVA, specifically the amount of electricity

   b. The motivation behind TVA

   c. The short range results of TVA, specifically the amount of electricity and thus the quality of life

   d. The increased industrial growth as a result of the TVA navigation system and the resulting pollution

   e. Future development and problems for TVA and the surrounding area

2. Show the filmstrip.

3. Use the following terms as a focal point for discussion.

Flooding	$200/year income
Electricity	Industrial growth
Recreation	Air and water pollution
Depression	Nuclear power
Navigation	Thermal pollution

DISCUSSION QUESTIONS

1. What was life like before TVA?

2. Would you prefer this style of living to your own?

3. How has TVA helped these people?

4. How has TVA hurt these people?

5. What things would you change if you had the power to start TVA from its beginning?

6. Have the students make a list of positive and negative aspects of TVA.

7. Are these examples of how technology has helped in your area?

8. What was life like before these changes?

OPTION #3 cont.

9. Have there been any problems or do you foresee any problems in the future?

10. Are there any areas of the country, including your own, that might benefit from any form of technology? Give examples.

11. What things should we consider before taking such a large step such as TVA?

12. What are some of the things that seemed to be overlooked in the past? Environment, individual needs versus group needs?

TECHNOLOGY 11

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to explain and illustrate how the patterns and practices in the use of natural resources are influenced by lifestyle and level of industrialization.

SUBJECT AREAS:

Art, Mathematics, Social Studies, Science

OPTION #1 - four class periods

MATERIALS AND RESOURCES

Forms A, B, C, and D

PROCEDURE:

In this option we are going to ask each student to interview people that know about the lifestyle since the turn of the century.

On Friday give each student a copy of Form A. Tell them to interview a person who remembers each of the time periods indicated.

With this survey completed, ask the students to respond to the following questions:

DISCUSSION QUESTIONS

1. What do we mean by lifestyle?
2. How has lifestyle changed over the past 75 years?
3. How did the people you interviewed feel about the quality of their lifestyle?
4. Do you feel that all of the changes are for the better?
5. How do you feel about the lifestyle your children might have?
6. What can you do to improve their lifestyle?
7. Fill in the values survey and discuss their lifestyle. (Chart B)
8. How many inventions (Form C) have occurred since 1900? What inventions do you think may appear in the next 25 years to change our lifestyle? Can you design one?
9. How might these changes influence the environment? Keep in mind atomic energy and the size of some of our machinery. See Form D.

Take all of the survey results and compare the following:

USES of energy
USES of resources
Luxury items in the home
Cost of food
Wages
Percent of income spent on food
Percent of income spent on luxuries

OPTION #1 FORM A

NAME _____ AGE ____ TIME PERIOD 1900-1920

1. How was your home heated?
2. Did your family own a car?
3. How did people get to and from work?
4. How far did you live from your place of work?
5. How much did people get paid per hour for working?
6. Did you have any electrical appliances? What?
7. What did you do for entertainment
8. How much did you pay for the following?

bread _____ milk _____ hamburger _____ a pair of shoes _____

gasoline per gallon _____ movies _____ automobile _____

homes (three-bedroom) _____

NAME _____ AGE ____ TIME PERIOD 1930-1950

1. How was your home heated?
2. Did your family own a car?
3. How did people get to and from work?
4. How far did you live from your place of work?
5. How much did people get paid per hour for working?
6. Did you have any electrical appliances? What?
7. What did you do for entertainment?
8. How much did you pay for the following?

bread _____ milk _____ hamburger _____ a pair of shoes _____

gasoline per gallon _____ movies _____ automobile _____

homes (three-bedroom) _____

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OPTION #1 FORM A CONT.

NAME _____ AGE _____ TIME PERIOD 1960-1976

1. How is your home heated?
2. How many cars does your family have?
3. How do you get to and from work?
4. How far do you live from your place of work?
5. How much do people get paid per hour for working? (average)
6. How many electrical appliances do you have in your home?
7. What do you do for entertainment?
8. How much do you pay for the following?

bread _____ milk _____ hamburger _____ a pair of shoes _____

gasoline per gallon _____ movies _____ automobile _____

home (three bedroom) _____

NAME _____ AGE _____ TIME PERIOD 1990+

1. How do you think your home will be heated?
2. What kind of auto do you think you will own?
3. How many do you think you will have?
4. Will people live closer or farther from their place of work?
5. How will people get to and from work?
6. What will wages be like in this period?
7. Will we use more or less energy in our homes? Why?
8. What will people do for entertainment? Why?
9. Will food change in this period? Why?
10. How will the cost of living increase in the next twenty years?

OPTION #1 VALUES SURVEY FORM B

ITEMS YOU HAVE AT HOME	NECESSITY	LUXURY
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

FORM C

INVENTIONS

1900-1930	1930-1950	1950-PRESENT
1903 powered airplane	1930 jet propelled aircraft	1950 hydrogen bomb
1907 helicopter	1935 fluorescent light	1952 polio vaccine
1909 electric self-starter for autos	1937 xerography	1955 transoceanic cable
1909 motion picture camera and projector	1939 atomic bomb	1955 IBM electrical machine
1913 x-ray tubes	1940 dacron	1956 atomic power station for production of electricity
1915 transatlantic telephone calls	1943 aqualung	1957 Sputnik I
1918 hydraulic four-wheel brake system	1946 electronic digital computer	1958 satellite Vanguard rockets
1924 radar	1946 general purpose relay calculator	1950's artificial organs
1924 rayon	1948 transistor	1960 laser beam
1926 liquid fuel rocket	1948 Polaroid	1968 supersonic transport
1928 pencillin	1948 teflon	1971 lunar Rover

FUTURE HOPES

Drug control and change of personality characteristics such as anxiety and aggressiveness

Cheap and clean electrical power from thermonuclear plants

Mass economic fertility control agents in water and food

Corporate employment at home via improved communications

Major world cities linked by high-speed ground, rail, and air vehicles

Increased world agricultural production

Drugs to raise intelligence levels

Comprehending computers with IQ's of 150

Construction of cities underground or underwater

Chemical control over hereditary defects by gene modification

Effective regional weather control at acceptable costs

OPTION #1 FORM D 9

BETTER HEALTH

GREAT POWER FOR GOOD

MORE SERVICES AND GOODS

HIGH STANDARD OF LIVING

MORE AND MORE KNOWLEDGE

MANY CHOICES AND OPPORTUNITIES FOR INDIVIDUALS

BOOMS AND SLUMPS

WASTE AND POLLUTION

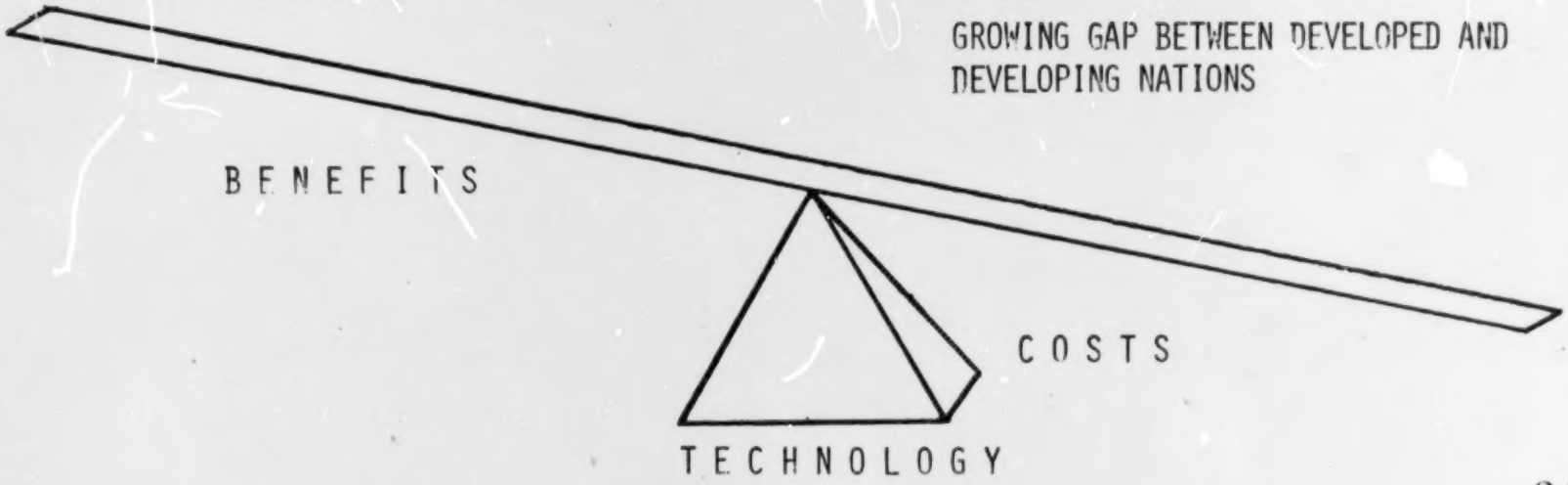
PROBLEMS OF CONTROL

GREAT POWER FOR EVIL AND DESTRUCTION

POPULATION EXPLOSION AND URBAN PROBLEMS

DEPERSONALIZATION, INSECURITY, MENTAL ILLNESS

GROWING GAP BETWEEN DEVELOPED AND DEVELOPING NATIONS



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OPTION #2

MATERIALS AND RESOURCES

Form B (option #1) Film, Automania
Auto survey test, Form E

PROCEDURE:

This option will focus on the understanding of a particular aspect of their lifestyle and how it affects the environment. You can use any aspect you choose but we will deal with a specific illustration, the auto.

1. Give each student the questionnaire, Form E, and ask them to complete them.

2. Give them the values survey, Form B, and ask them to list all the ways they use the auto. Complete the chart by noting uses that are luxuries and necessities.

3. Show the film listed above.

4. Discuss how they feel about such dependency upon the auto. Form A from option #1 can help the students to understand how their lifestyle has changed in the past 70 years.

5. Discuss the impact, both positive and negative, that the auto has had on our society.

DISCUSSION QUESTIONS

1. Do you feel the auto has had more beneficial or detrimental effects on society?

2. Why has the auto become such an important part of American lifestyle, more so than in many foreign countries?

3. Why are big cars a symbol of American society while many imported autos are much smaller?

4. Could our society function if automobiles were suddenly gone?

5. How would this change our lifestyle?

OPTION #2 AUTO SURVEY TEST FORM E

1. THE EFFICIENCY OF THE AUTO HAS INCREASED/DECREASED SINCE 1940.

2. AN AUTO MOVING ONE BLOCK CONSUMES THE OXYGEN NEEDED BY 25/50/100/125 HUMANS FOR ONE MONTH.

3. EMISSION CONTROLS HAVE BEEN ON UNITED STATES AUTOS SINCE 1964/1966/1967/1970.

4. THE AVERAGE UNITED STATES AUTO EMITS 2.8/3.6/3.9/4.1 POUNDS OF POLLUTANTS FOR EACH GALLON OF GASOLINE USED.

5. AIR POLLUTION COSTS MORE/LESS TO CONTROL THAN THE DAMAGE THAT IT CAUSES EACH YEAR. (10.7 BILLION VERSUS 16 BILLION)

6. WHAT PERCENTAGE OF DOWNTOWN CHICAGO LAND IS DEVOTED TO THE AUTO? (46%)

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OPTION #3

MATERIALS AND RESOURCES

Two mice or gerbils
Two mazes, one T-maze and one complex maze (See Diagram I.)
Food in the form of pellets

PROCEDURE*:

1. Set up two mazes.
2. Put the food at one end of each maze and a mouse/gerbil at the other end.
3. Have each student keep track of how many trials are needed for the mouse/gerbil to be successful.
4. Repeat the procedure until the mouse/gerbil can achieve success by correctly running the maze three consecutive times.
5. This project can be expanded by constructing several mazes and having the students graph the energy output (number of trials to success) to the complexity of the maze (number of decision points, points at which a right or left turn must be decided upon).

DISCUSSION QUESTIONS:

1. How did the lifestyles of the mice differ? (The more complex maze represents a more complex lifestyle.)
2. How did the number of trials relate to the complexity (stress) of the maze?
3. What would happen to the number of trials if a more complex maze was used?
4. How does the complexity of the maze relate to the complexity (stress) of our lifestyle?
5. What is happening to our resources?
6. Why are we using them up faster than our ancestors did?
7. What drives the mouse on? (need)
8. What are the needs that can drive us onward?

*NOTE: This experiment is designed to show the relationship of energy output as compared to the complexity of the task. Both a simple task (running a maze) and a complex task (living in our complex world) require an energy output. They are related in that the graph can represent a microcosm of our world, a world in which the complexity of lifestyle varies as can the complexity (stress) of the maze.

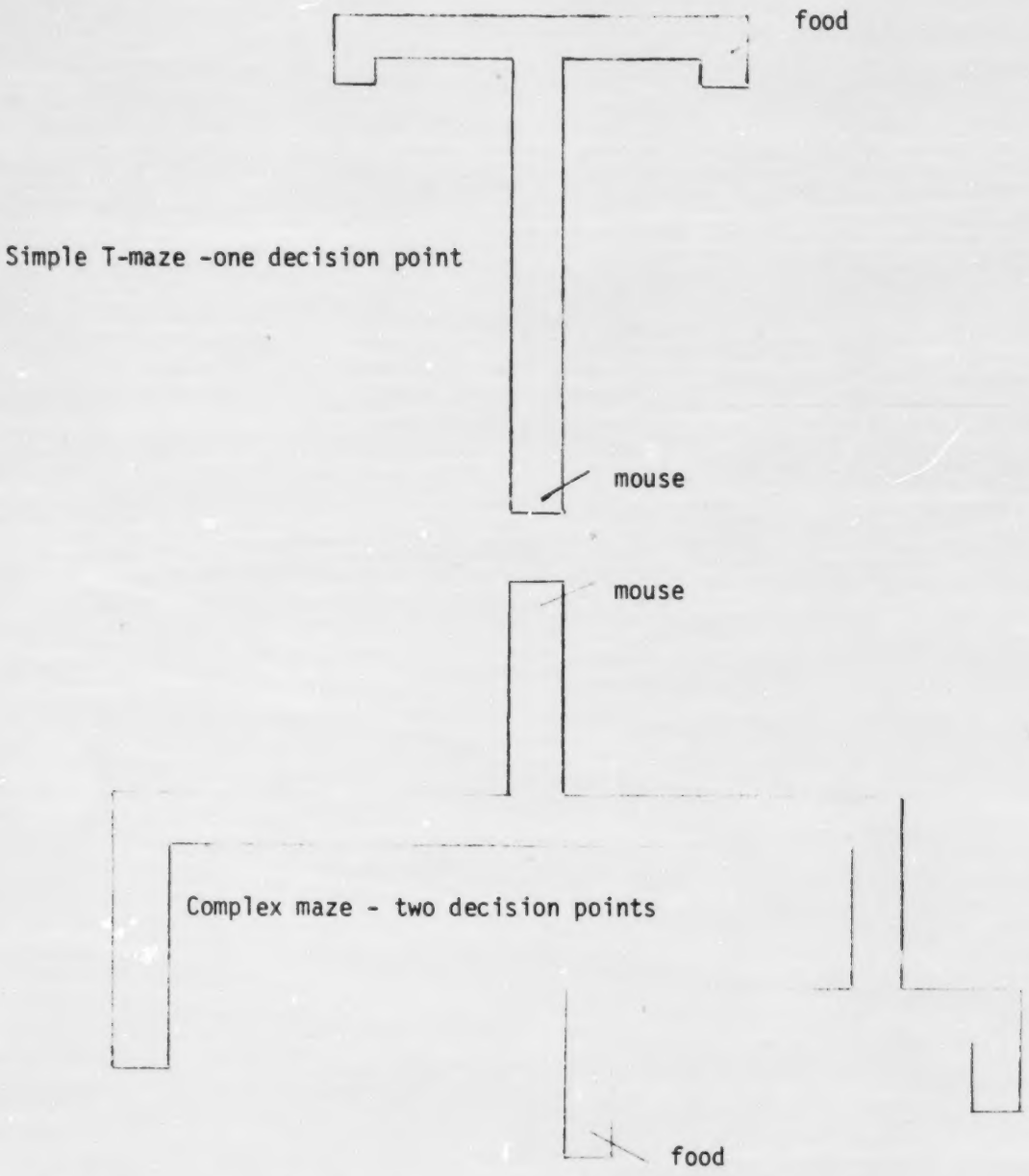
OPTION #3 cont.

9. How do we overcome stress? (Look for things like air-conditioned homes and automobiles, long vacations, alcohol, drugs, psychiatrists, ulcers, etc.)

10. Would you "waste" less energy in a simple society? Explain.

OPTION #3

DIAGRAM I



Food at spot 1 is less complex to reach than spot 2.

Mazes can be constructed out of cardboard or wood. Walls should be at least 5" high.

TECHNOLOGY 12

BEHAVIORAL OBJECTIVE:

At the completion of this unit the student will be able to demonstrate or explain how the consumption of resources increases with the demand for goods.

SUBJECT AREAS:

Art, Science, Mathematics, Social Studies

OPTION #1

MATERIALS AND RESOURCES

Chart 1 with situation cards A-E
Chart 2

PROCEDURE:

1. Divide the class into five groups.
2. Give each group one of the situation cards.
3. Have each group write a brief description on their lifestyle. Make certain groups include the size of family, average life span, possible causes of death, major occupations, etc.
4. Have the students complete Chart 2.
5. Open for discussion.

DISCUSSION QUESTIONS

1. Which period has the greatest impact on the environment?
2. Judging from the items on the lists, how has resource consumption changed over the last 450 years?
3. What factors have brought this change about?
4. How have costs changed for resources used today and for the same resources used 100 years ago?
5. What factors have brought this about?
6. How does the lifestyle for 2000 sound to you?
7. What can be done to alter this?
8. How many children would you like to have? (Total these for the entire class.)
9. How will these new people affect the future pattern of resource use and price?
10. How does advertising affect consumer demand for products and resource usage?
11. Do manufacturers show a concern for resource usage? How? Why or why not?
12. Would it be possible for everyone in the U. S. to grow his own food and make his own clothes? Why or why not?
13. What are some activities you do which require no resources at all?
14. Are there any human activities which require no resources at all?
15. Do new inventions usually need more energy to operate/produce?

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OPTION #1 SITUATION CARDS

PRE-INDUSTRIAL 1500 SITUATION CARD A

1. HOME OF CLAY, STRAW-MORTAR MIX OR WOOD
2. FOOD GROWN IN GARDEN OR PURCHASED AT A LOCAL MARKET
3. SCHOOLS NOT AVAILABLE
4. TRANSPORTATION BY FOOT
5. POOR TO DANGEROUS MEDICAL TREATMENT
6. ENERGY IN SLIGHT DEMAND, MOSTLY POOR FOSSIL FUELS
7. VERY FEW INDUSTRIES, MOSTLY CRAFTS
8. ENVIRONMENT HAS POOR AIR AND WATER QUALITY BUT IT IS LOCALIZED TO SMALL CITIES.
9. LOW POPULATION DENSITY EXCEPT FOR CITIES
10. NO SANITARY FACILITIES

CIVIL WAR 1870 SITUATION CARD B

1. WOOD OR BRICK HOME
2. FOOD GROWN AT HOME, PURCHASED A LOCAL MARKET PLACE, OR BOUGHT FROM PEDDLER
3. SMALL SCHOOLS AVAILABLE TO A FEW
4. TRAVEL BY FOOT AND HORSEBACK OR CARRIAGE
5. POOR TO DANGEROUS MEDICAL TREATMENT
6. ENERGY IN GREATER DEMAND, POORER FOSSIL FUELS
7. FEW INDUSTRIES, CHEAP LABOR, CRAFTS DECLINING
8. BETTER AIR AND WATER QUALITY BUT THE SPREAD OF CITIES IS AFFECTING MORE AREAS.
9. VERY LOW POPULATION DENSITY EXCEPT FOR EASTERN CITIES.
10. SOME SANITARY FACILITIES, MOST WITHOUT

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DEPRESSION ERA 1935 SITUATION CARD C

1. WOOD OR BRICK HOMES
2. FOOD PURCHASED AT THE STORE
3. SCHOOLING READILY AVAILABLE
4. CARS, STREETCARS, TRAINS AVAILABLE
5. IMPROVING MEDICINE, HOSPITALS
6. ELECTRICITY IN SOME HOMES, MORE USE OF ENERGY, LARGE POWER PLANTS
7. MANY INDUSTRIES BUT MUCH UNEMPLOYMENT
8. POOR AIR AND WATER AIDED BY TREATMENT, SPREADING WESTWARD
9. HIGH POPULATION DENSITY IN MANY CITIES
10. MOST HOMES HAVE INDOOR PLUMBING

TODAY 1976 SITUATION CARD D

1. WOOD OR BRICK HOMES
2. FOOD PURCHASED AT SUPERMARKET
3. SCHOOLING READILY AVAILABLE
4. CARS, TRAINS, PLANES, BUSES, MOTORCYCLES, SUBWAYS AVAILABLE
5. HIGH QUALITY MEDICINE, ORGAN TRANSPLANTS, ANTIBIOTICS, VACCINATIONS
6. NUCLEAR POWER, ALL ELECTRIC HOMES, GADGETS IN ABUNDANCE, ENERGY SHORTAGE
7. TOTAL INDUSTRIALIZATION, MUCH UNEMPLOYMENT
8. POOR AIR AND WATER QUALITY, WILD AREAS BEING LOST, CITIES STARTING TO IMPROVE
9. LARGER CITIES, URBAL SPRAWL, HIGH POPULATION DENSITY
10. ALL HOMES HAVE SANITARY FACILITIES

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SITUATION CARD E

IN THE FUTURE 2000

1. PLASTIC OR SPRAY MORTAR STRUCTURE FOR HOMES
2. FOOD SYNTHETIC BOUGHT FROM STORES
3. SCHOOLING FROM TELEVISION AND SLEEP TAPES
4. AUTOS BECOMING OBSOLETE, SST, 200 MPH TRAINS, SUBWAYS, MONORAILS, MASS TRANSIT NETWORKS ALL AVAILABLE
5. GENETIC CODING, COMPUTER DIAGNOSIS, ALL PURPOSE VACCINATIONS, NO DISEASE
6. PLENTIFUL NUCLEAR POWER, PRINCIPALLY AN ELECTRIC ECONOMY, DECREASING USE OF FOSSIL FUELS
7. MOST SERVICE JOBS, MOST INDUSTRIES AUTOMATED
8. WILD AREAS BUILT IN CITIES, AIR AND WATER QUALITY COMPUTER REGULATED
9. VERY HIGH POPULATION DENSITY BUT PEOPLE ARE BETTER ADJUSTED
10. TOTAL SANITARY FACILITIES, DIET DESIGNED TO REDUCE NEED

DEGREE OF USE OF DIFFERENT ASPECTS OF THE ENVIRONMENT

(LIST HOW AND WHY FOR EACH COLUMN)

PERIOD _____

LAND - NUMBER OF SQUARE FEET/FAMILY
ENERGY - HOW MANY HOURS DAILY
PEOPLE - NUMBER PER SQUARE MILE
OPEN SPACE - 1) A GREAT DEAL 2) SOME 3) A LITTLE 4) NONE AT ALL
TECHNOLOGY - DESCRIBE MACHINES USED
ENVIRONMENTAL IMPACT

OPTION #1
CHART #2

OPTION #2 - six to seven days

MATERIALS AND RESOURCES

Charts 3 and 4

PROCEDURE:

Very often we do not realize the effects our choices have on the total impact on the environment. This option uses two surveys to focus on the home and personal lifestyle.

Ask the students to complete Charts 3 and 4 prior to this exercise. When they return to class tabulate and discuss their results.

DISCUSSION QUESTIONS

1. How do your choices reflect the typical American lifestyle?
2. Should we limit people's rights to own energy and natural resources - using devices like air conditioners, electric heat, electric toothbrushes? Why or why not?
3. "There will always be a little pollution in order to be prosperous." Do you agree with this statement? Why or why not?
4. The standard of living in the U. S. is the highest in the world. Should we maintain it as such? Why or why not?
5. If you were taxed each time you used an electric item, would you pay or protest? Why?
6. Some people argue that we ought to live without all the comforts of life. What is your feeling on this statement?
7. Should we raise the cost of natural resources and energy so that people will regulate their use?
8. If man continues his present patterns in growth and use of goods, what dangers do you see in the future?

OPTION #2 CHART 4

RESOURCE USE FORM

DIRECTIONS:

IN THE CHART BELOW, PLEASE DO THE FOLLOWING:

IN COLUMN A: BEFORE LEAVING TODAY PLEASE ESTIMATE THE NUMBER OF EACH OF THE LISTED ITEMS YOU HAVE IN YOUR HOME. LIST THE TOTAL NUMBER WHETHER THEY ARE USED OR NOT.

IN COLUMN B: AFTER YOU ARRIVE HOME TONIGHT, TAKE AS ACCURATE A COUNT AS POSSIBLE, THEN LIST THE TOTAL OF EACH ITEM IN COLUMN B.

IN COLUMN C: LIST WHAT PERCENTAGE (OR HAVE STUDENTS LIST FRACTIONS SUCH AS ¼, ½) TO INDICATE WHAT PORTION OF THE TIME THAT THE ITEMS ARE IN USE AS A NECESSITY.

	A	B	C
TABLE LAMPS			
LIGHTING FIXTURES (OVERHEAD)			
HI-INTENSITY LAMPS			
FLUORESCENT LAMPS			
ELECTRIC CLOCKS			
ELECTRIC WATER HEATER			
ELECTRIC HEAT			
ELECTRIC AIR CONDITIONER			
ELECTRIC RADIO			
TELEVISION			
STEREO			
RECORD PLAYER			
TAPE RECORDER			
MUSICAL INSTRUMENTS (ELECTRIC)			
DOORBELL			
INTERCOM SYSTEM			
FAN			
COFFEE POT			

OPTION #2

CHART 4 CONT.

	A	B	C
VACUUM CLEANER			
GARBAGE COMPACTOR			
IRON			
WASHER			
DRYER			
DISHWASHER			
REFRIGERATOR			
RANGE			
FREEZER			
ELECTRIC KNIFE			
BLENDER			
ELECTRIC MIXER			
ICE CRUSHER			
CAN OPENER			
PRESSURE COOKER			
FRY PAN			
GRILL			
BROILER OVEN			
CORN POPPER			
TOASTER			
TOOTHBRUSH			
WATER PIC			
COMB			
TYPEWRITER			
RAZOR			
ELECTRIC CURLERS			
HAIR DRYER			
BLANKET			
SHAVING CREAM DISPENSER			
SEWING MACHINE			
ELECTRIC SCISSORS			

OPTION #2 CHART 4 CONT.

PART D

WHAT RESOURCES ARE NEEDED TO PRODUCE THESE ITEMS? HOW MANY OF THESE ITEMS WERE UNHEARD OF 20 YEARS AGO?

OPTION #3

MATERIALS AND RESOURCES

School cafeteria (If no lunch is served, see further activities.)
Graph paper
Data sheets
Worksheets

PROCEDURE:

The objective of this unit is to have the students compile data, graph the data, multiply common fractions, and determine percentages.

Vocabulary - Let ETU = Energy Time Use
Let MH = Man Hours
Let LS = Lunches served (total)

1. Have the students survey the school lunch program. See data sheets. The class can leave the data sheet with the cooks or if time and scheduling allows, the students can record the data themselves.

2. Explanation of data

   a. ETU - Energy time use is a measurement of the amount of time an electrical or gas appliance is in use. For example: range = 90 minutes of energy use and refrigerator = 180 minutes of energy use, and so on for each appliance.

   b. MH - Man hours is the total number of man hours used in the kitchen. For example: five cooks working five hours each = 25 MH.

   c. LS - Lunches served is the total number of lunches served in any given day.

3. Data sheet instructions

   a. Students should survey the cafeteria for at least three days.

   b. Record the ETU, MH, and LS for each day of the survey.

   c. Students should then compute subtotals and averages for each appliance. Also convert manhours into ETU. $\frac{1}{16}$ is the multiplier.

   d. Students should now transfer data from data sheet 1 to data sheet 2.

4. Students now have two data sheets of information and are ready for problems. The problems are designed to reach the behavioral objective of the unit.

PROBLEMS

By leaving some squares of information blank on the practice worksheet, have the students use the available data to compute the missing information. This is hypothetical data.

The following problems are based on the data of your school.

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OPTION #3 cont.

1. If student lunches dropped by one third, how would that affect the average?

2. If student lunches increased by 41% how would that affect the average?

3. If power was cut by one eighth each day how would this affect the average?

4. If man hours were cut by one person each day how would that affect the chart?

5. Have the students practice the concept of more demand = more ETU.

6. Have the students develop a formula that would indicate the total ETU needed to produce a lunch for one individual.

   For example: $\frac{LS}{ETU}$ = individual energy time demand

   or

   $\frac{\text{Goods produced}}{\text{Resources}}$ = energy demand

   or

   $\frac{\text{Energy demand}}{\text{Individual}}$ = individual energy consumption

7. Have the students graph each day's findings, the totals, and the final averages.

DISCUSSION QUESTIONS

1. Did our totals vary from day to day? List the reasons why.

2. Can our findings be used to determine any other types of energy use? List some.

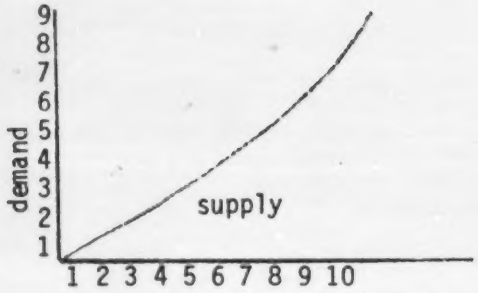
3. If we increase the number of cars produced, what will the effect be on the economy?

   a. Amount of gasoline sold and produced
   b. Amount of people to produce and sell
   c. Amount of pollution produced

4. Are there any generalizations we can make about energy consumption versus demand of a product?

5. Provide the students with a supply and demand curve.

OPTION #3 cont.



a. How does this graph look like our graphs?

b. What relationship does demand have with supply?

c. If we use energy instead of demand would it be the same?

6. Take an example of the formulas presented to compute individual energy demands and show the class.

$\frac{LS}{ETU}$ = Individual energy time demand

$\frac{435}{1958} = .2$ $\qquad$ $\frac{1958}{.2}$ = 9 minutes of individual energy demand/day

a. What would influence the above formula?

b. What if the LS was reduced by two thirds?

FURTHER ACTIVITIES

If your school does not have a hot lunch program, have the students survey their own home kitchens. Compile the data into a class average and work from that point.

DATA SHEET 1

OPTION #3

	ETU DAY 1	ETU DAY 2	ETU DAY 3	ETU DAY 4	ETU DAY 5	ETU SUBTOTAL	AVERAGE
Range							
Refrigerator							
Freezer							
Oven							
Steam tables							
Lights							
Mixer							
Dishwasher							
Other							
Other							
Man hours *							

* Convert manhours into ETU by using 1/16 as a multiplier.

EXAMPLE: 200 ETU times 1/4 = 50 manhours

TOTAL LS

DAY 1 ___
DAY 2 ___
DAY 3 ___
DAY 4 ___
DAY 5 ___

TOTAL ETU _____ AVERAGE ETU _____

DATA SHEET 2

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	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	TOTAL	AVERAGE
.UNCHES SERVED							
:NERGY TIME USE							
1ANHOURS							

OPTION #3

PRACTICE WORKSHEET - SEE INSTRUCTIONS

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	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	TOTAL	AVERAGE
LUNCHES SERVED	400	560	384	640	192	2176	435.2
ENERGY TIME USAGE	1800	2520	1728	2880	864	9792	1958.4
MANHOURS	25	35	24	40	12	136	27.2

OPTION #3

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